

Color Mavens Advise on Digital Media Creation and Tools

SIGGRAPH 2018 Panel

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CCS CONCEPTS

• **Human-centered computing** → Visualization theory, concepts and paradigms; Displays and imagers; • **Applied computing** → Media arts; • **Computing methodologies** → Perception;

KEYWORDS

Color Science, Digital Media, Color Appearance

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1 INTRODUCTION

Designing and capturing a color scheme for a digital media composition is an important step in the creation pipeline. Whether it is an immersive experience, animation or visualization, color selection is key to conveying the message or story. In this panel, we assemble a group of color experts, *aka* "Color Mavens," to convey and

*Organizer/Moderator

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define color appearance and colorization methods. Each panelist represents a particular color advice approach whether it includes a recommended set of guidelines for color appearance, suggested color schemes, a tool for color capture, an application for color palette creation or tips from colorization experiences. Each panelist will highlight their methods with a team discussion about optimal colorization approaches to follow. The panel will also identify gaps in our understanding about the use of color in digital media composition as well as identifying future application and research directions.

2 PANELIST POSITION STATEMENTS

Nicholas Bazarian, X-Rite / Pantone

Color is often the most critical design element for influencing purchasing decisions with consumers. If it is not accurate or consistent with brand standards, color is also the design element most likely to derail a sale, particularly when it sits on the store shelf. As Pantone's Digital Product Manager, I will discuss the products and extensive data our team has developed for designers, pre-media, and printers to keep color predictable, achievable, and consistent. These products facilitate the color selection process and set realistic expectations early in design, and improve communication with color producers, thus reducing rework, time and cost for everyone involved.

Jose Echevarria, Adobe

Over the centuries, different generations of creatives and scientists have leveraged color wheels to study relationships between colors, with respect to composition, analysis and aesthetics. In the digital world, color wheels can expand to be the model, the visualization and the user interface. However, existing tools built on top of this foundation are intuitive but quite limited in their scope, somehow constraining the creativity of their users. We will highlight how Adobe is embracing some of those concepts along with new ones, to build a new wave of color tools pushing the boundaries of what is possible today. These solutions include:

- Enhanced creation and refinement of color themes.
- More meaningful and capable color-aware searches.
- New intuitive and powerful tools to apply color themes and/or improve the color composition of designs, images or videos.
- Re-imagined color mixing for digital painting, beyond real world limitations.

Michael J. Murdoch, RIT

The visual appearance of colors is always affected by how they are presented: on what kind of media, in what kind of viewing environment, and with what surroundings. Color appearance models are designed to predict the state of adaptation of a viewer and thereby the changes colors appear to undergo when the presentation environment is changed. Such models highlight the differences between appearances as colors are transferred between a printed page, a desktop or mobile display, and an immersive or augmented space given their respective lighting environments. Some concepts for discussion:

- Color appearance phenomena such as simultaneous contrast and common color and luminance effects, and how they might impact creating and building digital media.
- Effects of digital display viewing environments on color and image perception.
- Color appearance effects observed in optical see-through Augmented Reality.
- The state of art in color appearance modeling.
- Suggestions on what to expect and avoid in color appearance across digital media platforms.

Danielle Feinberg, Pixar

In feature films color is heavily used to illicit emotion. In computer animation we have the ultimate control over color, using it to do things like help set location, to summon the essence of a specific place, to increase the intensity of an action scene or bring quiet to set the stage for an important moment. We use all of these elements to tell the richest stories possible, stories that connect on a deeper emotional level with the audience. Some examples we will discuss include:

- In WALL-E we found that if the images became too red the audience automatically thought it was Mars and not Earth, a significant problem when trying to explain to the audience our geographic location without dialog (because WALL-E doesn't actually speak).
- The addition of green fluorescent lights to a scene in Coco helped to capture the feeling of being in Mexico instead of a generic animated film scene.
- Amping up the intensity of a chase scene in Coco by creating different colored pools of light so audience can feel the many locations we pass through.
- During the creation of the color script for Coco, we realized we had lost our typical tools to illicit emotion - color, time of day and weather - because most of the film took place at night in the Land of the Dead, with no weather change and a riot of color. In the end we reduced color to signal to the audience that something important was about to happen.

3 PANELIST BIOGRAPHIES

Theresa-Marie Rhyne, Organizer / Moderator

Theresa-Marie is a long time contributor to the SIGGRAPH community with her course on color fundamentals being included as part of the SIGGRAPH University video series. Her book on *Applying Color Theory to Digital Media and Visualization* was published by

CRC Press in November 2016. She has consulted with the Stanford University Visualization Group on a Color Suggestion Prototype System, the Center for Visualization at the University of California at Davis and the Scientific Computing and Imaging Institute at the University of Utah on applying color theory to Ensemble Data Visualization. Prior to her consulting work, she founded two visualization centers: (a) the United States Environmental Protection Agency's Scientific Visualization Center in the 1990s and (b) the Center for Visualization and Analytics at North Carolina State University in the 2000s.

Nicholas Bazarian, X-Rite / Pantone

Nick Bazarian is Pantone's Digital Product Manager, responsible for bringing Pantone's color to designers and spectral data to color producers in the form of software products and tech partnerships. Since joining Pantone in 2016, he has led the launch of Pantone Studio for iOS and most recently PantoneLIVE Design. Nick brings a mix of color and tech experience to Pantone, with an educational background as a painter and professional experience as an IT Consultant for IBM, where he led teams to develop apps for FEMA during major disasters including Hurricanes Sandy and Irene.

Jose Echevarria, Adobe

Jose Echevarria is a Research Scientist at Adobe Systems, working on a variety of topics at the intersection of art and science. His most recent research around color focuses on areas like design, aesthetics, painting and other color-aware tools across different products and media. Previously he worked on profiling and compensation of color vision defects. He received his BS and MS in Computer Science Engineering, and his PhD in Computer Graphics from University of Zaragoza in Spain.

Michael J. Murdoch, RIT

Michael is an Assistant Professor in RIT's Munsell Color Science Laboratory, where he teaches psychophysical methods, programming, and lighting perception topics. His current research includes measuring color appearance and visual adaptation in Augmented/Mixed Reality (AR/MR) and studying the effects of temporally dynamic lighting on visual adaptation and perceived rate of change. He also has deep experience with display color perception and system design. His education includes BS in engineering from Cornell, MS in computer science from RIT, and PhD in human-technology interaction from Eindhoven University of Technology in The Netherlands.

Danielle Feinberg, Pixar

Danielle Feinberg is the Director of Photography for Lighting at Pixar Animation Studios. A lifelong color nerd, she was finally fully sated after directing the lighting and heading up the color script for the color extravaganza know as Pixar's Coco. 21 years ago, Feinberg parlayed her computer science degree from Harvard into, first, a technical, problem solving job at Pixar and then eventually, working her way up to one of the top jobs combining tech and art, DP for Lighting. She has worked on 13 of Pixar's films, directing the lighting for WALL-E, Brave and Coco.